

\*\* The disclosure form is best viewed at 1024 x 768 resolution \*\*

micon  
LAW DEPARTMENT

Nortel Networks Internal Use Only - Not for Distribution

NORTEL  
NORTHERN TELECOM

\* Denotes a mandatory field

## INVENTION DISCLOSURE SUBMISSION

## \* Invention Title:

A Voice Activity Detector For Packet Voice Network

## Full legal name of 1st Inventor

\* Last Name:

Wang

\* First Name:

Zifei

Middle Name:

Peter

## Name usually known as:

Peter Wang

## \* Global ID Number

## \* Phone (esn)

## Fax (esn)

## \* Location

LAVE

## Occupation

Sr. Member of Tech

## \* Department

5110

## Mailstop

## \* Residence address:

\* Citizen of: PRC

To list more inventors, [click here](#).

\* Name of supervisor or divisional head:

Name of AVP Rep:

\* Indicate Your LOB:

Enterprise Networks

If Advanced Technology, please indicate which group:

Please Make a Selection

Does this invention arise from any arrangement involving an external organization? ☐ Yes ☒ No

If so,

Name of organization:

Contract No:

Technical field:

Date of first written description:

Has this invention been discussed with others? If so, please com

Inside Nortel

Outside No:

To Whom?

To Whom?

When?

When?

Was there a Non-Disclosure

Are you aware of any imminent future disclosures? If so, please provide da



This algorithm will be implemented on Marathon withing one month. After a short validation, it will be released to customer.

**Which products will use this invention?**

This is a generic DSP algorithm. It will be used on Marathon (Micom Voice Over Frame Relay product), Passport 4400, VIP (Voice Over IP product) and CPE-M (Voice Over ATM product).

**Key words for searching:**

VAD, SAD, DTX, silence detector, voice activity detector, silence suppression, pink noise, color noise.

Is this invention relevant to a Standards activity? ☐ Yes ☒ No

If so, give details:

Internal Project numbers under which this invention was fund

---

## Technical Information

(This section must be completed.)

### Brief description of the invention:

A typical discontinuous transmission system (DTX) consists of a activity detector and a comfort noise generator (CNG).

In this invention, we design an efficient VAD by only extracting a set of energy-based parameters of the speech signal --- short term energy tracking, long term energy tracking, peak mean ratio and peak mean likelihood ratio. Thus a voice activity decision space is spanned by these parameters and a set of decision logic is conceived to achieve less voice-clipping and better bandwidth saving.

What is the problem solved by the invention?



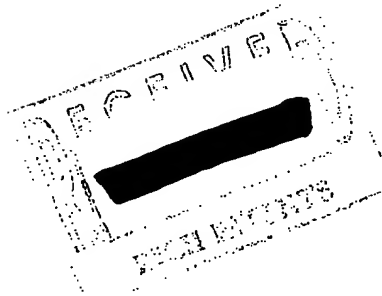
It usually requires a more complicated model to model the silence background and thus make a reliable decision whether it is voiced or silence frame, the complexity requires significant amount of processing power. In this invention, we have designed a set of parameters that are derived directly from the speech frame energy. The processing power needed for calculating this set of parameters is much less, but a reliable activity decision can still be reached.

#### **What other solutions have been tried and what were their shortcomings?**

The short term energy tracking plus long term energy tracking have been used for a class of simple VAD algorithm, which extracts only energy-based parameters. During a silence period, however, the long term tracking tends to catch up the short term energy tracking and results the decision making switches between voiced state and silence state frequently. The frequent switching between states will result degradation of the speech quality.

A new parameter called peak mean likelihood ratio is designed and thus one more dimension is introduced to the decision space. In the enlarged decision space, a set of decision logic is thus conceived to achieve more reliable decision. Moreover, the frequency of switching between voiced and silence state during the silence period is greatly reduced. A better voice quality is achieved.

**What are the specific elements or steps that solved the problem? Please provide some invention works.**



The parameter "peak mean likelihood ratio" is used to introduce one more dimension to the decision space. A set of new decision making rule is therefore designed to achieve less voice-clipping and more bandwidth saving during the silence period.

**What is the commercial value of the invention to Nortel and Nortel's major**

This invention can improve the voice quality and achieve better bandwidth saving for Nortel's packet voice network products like Marathon, VIP, Passport 4400, CPE-M.



NOTE: This form cannot be saved or printed. For your convenience, this form is available for saving or printing upon submission.

SUBMIT Invention Disclosure

ERASE Form and Start Over

**End of Form**

---



**Additional Inventors**

---